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MEDICAL JOURNAL

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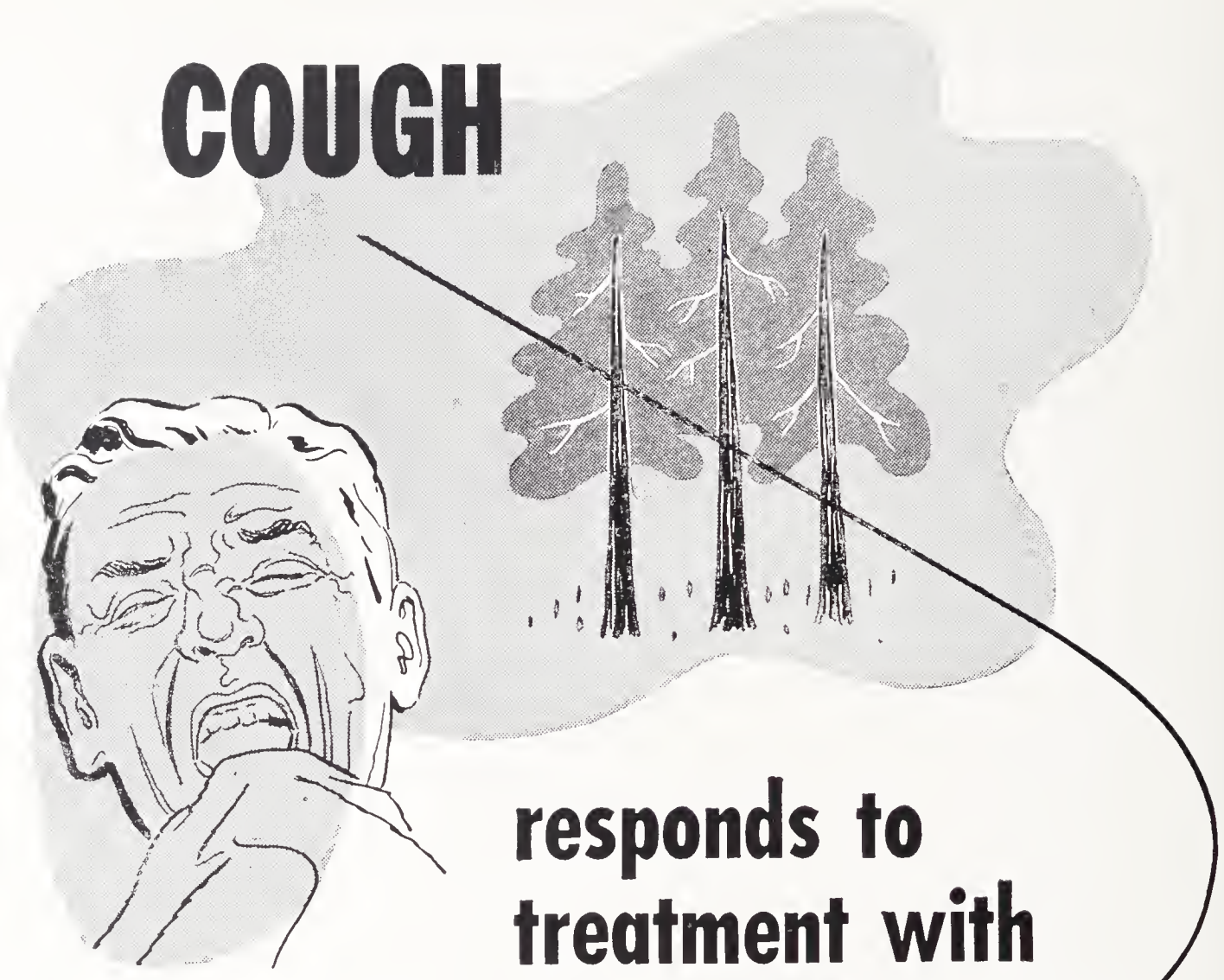

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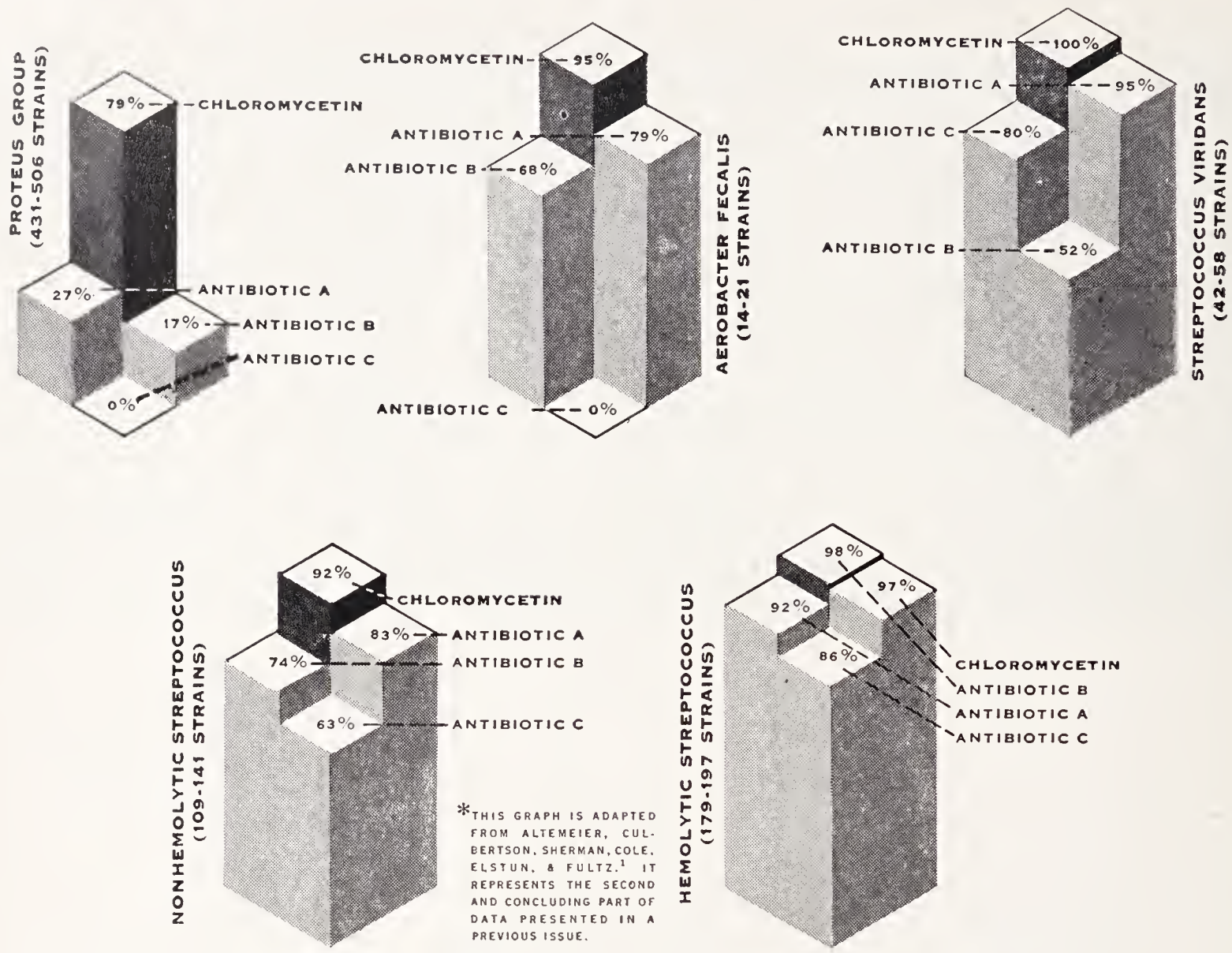

*THIS GRAPH IS ADAPTED FROM ALTEMEIER, CULBERTSON, SHERMAN, COLE, ELSTUN, & FULTZ.[1] IT REPRESENTS THE SECOND AND CONCLUDING PART OF DATA PRESENTED IN A PREVIOUS ISSUE.

REFERENCES: (1) Altemeier, W. A.; Culbertson, W. R.; Sherman, R.; Cole, W.; Elstun, W., & Fultz, C. T.: *J.A.M.A.* 157:305, 1955. (2) Weil, A. J., & Stempel, B.: *Antibiotic Med.* 1:319, 1955. (3) Jones, C. P.; Carter, B.; Thomas, W. L., & Creadiek, R. N.: *Obst. & Gynec.* 5:365, 1955. (4) Austrian, R.: *New York J. Med.* 55:2475, 1955. (5) Murphy, F. D., & Waisbren, B. A., in Murphy, F. D.: Medieal Emergeneies: Diagnosis and Treatment, ed. 5, Philadelphia, F. A. Davis Company, 1955, p. 557. (6) Felshin, G.: *J. Am. M. Women's A.* 10:51, 1955. (7) Kass, E. H.: *Am. J. Med.* 18:764, 1955. (8) Tebrock, H. E., & Young, W. N.: *New York J. Med.* 55:1159, 1955. (9) Stein, M. H., & Geehman, E.: *New England J. Med.* 252:906, 1955. (10) Braneh, A.; Starkey, D. H.; Rodgers, K. C., & Power, E. E., in Welch, H., & Marti-Ibáñez, F.: Antibiotics Annual, 1954-1955, New York, Medieal Eneyelopedia, Ine., 1955, p. 1125. (11) Munroe, D. S., & Coekeroft, W. H.: *Canad. M. A. J.* 72:586, 1955. (12) Norris, J. C.: *M. Times* 83:253, 1955.

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Editor-in-Chief ..... J. Q. Bliss, B.A., 5T6

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EDITORIAL

Rehabilitation—The Goal of Treatment

The battle against acute disease which has engaged the energies of the medical profession during the past half century has resulted in substantial victories. As a consequence, precise diagnosis and specific therapy or prevention have largely eliminated many of the morbid conditions which produced ill-health and terminated life, often at an early age. Similarly, patients who suffer grievous injuries with maiming, and others born with impaired function, are enabled to survive. The resulting prolongation of life permits more people, both the fit and the unfit, to reach the age where degenerative and crippling disease may take their toll. We are thus faced with the paradox that improved medical care having eliminated certain problems has created new and different ones, and these problems require solution.

These problems are medico-social in that they are concerned with the difficulties experienced by the disabled individual who would become integrated into the social and economic pattern of society. They are solved when the individual achieves normal social relationships and, through the performance of useful services, economic independence.

Disability may hamper a man or woman in many ways. For example, it may impede locomotion, as is the case with orthopedic disabilities, loss of limb, paralyzing diseases or arthritis. Impaired locomotion may hinder the adult in his effort to travel to and from a place of employment, or render him less agile in pursuit of his vocation, particularly where standing, walking or climbing are required. Thus osteoarthritis of the hip or knee may completely incapacitate a postman. Sometimes locomotion is impeded in the presence of sound limbs by some disorder which limits exercise tolerance, preventing the expenditure of extra effort in the pursuit of the daily round of activity. Thus, congenital heart disease may prevent the child from playing with his young associates or acquired heart disease hinder the adult from doing heavy work, or even from climbing stairs to reach his place of work. Disorders of the respiratory system may impose similar limitations on living and working and playing. These locomotor disabilities have long been recognized and treated and are perhaps handled more skilfully than other types of impairment.

Neurological disorders, arthritis or orthopedic disorders of the upper extremities, by impairing dexterity, may make it impossible to learn and practice a skill, whether it be swinging an axe, operating a punch press or using a typewriter. Thus skills of the mind cannot be projected into creative work.

Impairment of communication may constitute a major handicap. Communication is dependent on certain special senses, the ability to conceive and produce speech, the ability to comprehend what is spoken and written and the ability to write. Various deficits may occur. The stammerer is a trial to himself and to his listener, the person with a cleft palate may not be able to articulate clearly, the cerebral palsy case may suffer from dysarthria and the hemiplegic from aphasia. The deaf find it difficult to reproduce words and sentences they have never heard,

and the blind cannot see written characters and cannot write. The paralyzed or deformed hand does not produce legible script. With subnormal intelligence one may not possess the ability to conceive and produce speech.

Many are barred socially by mental or emotional abnormalities. The child who fails to reach emotional maturity is not accepted by his associates and later is an unreliable employee, and is not welcome at work or socially. The psychotic cannot discharge his responsibilities and thus is a social misfit. The periodic lapses of consciousness of the epileptic may prevent him from engaging in social and vocational activities.

The number of individuals in our society who are prevented from participating in productive enterprise by some form of disability or illness can be determined fairly accurately, but distress and economic loss must be computed on an individual basis to be meaningful.

The cost in human suffering must be evaluated in terms of personal loss suffered by the individual and his family. The distress is experienced psychologically, emotionally, and sometimes physically. It leads to unhappiness through frustration, to depression and sometimes to shame and embarrassment, for abhorrence of being different is deeply rooted in the human race. It may lead to emotional maladjustment on the part of the victim, particularly if the disability is congenital or is acquired in childhood. Sometimes those who are afflicted, if they are sensitive, fear to face the world and become withdrawn and will not mingle with their fellows, or, they may compensate and become overly aggressive and develop unpleasant personalities. Others may remain dependent and clinging and enslave all around them, particularly the members of their own families and any others they are able to ensnare.

Failure to become economically self-sufficient imposes the responsibility for the provision of sustenance on some other member of the family or on society as a whole. The economic cost can be computed in terms of maintenance costs in an institution, together with loss of earning potential. When the total number of misfits reaches a critical level, society is forced to take cognizance of this group in which economic need, bitterness and unhappiness threaten to contaminate the whole social structure.

It has been shown that the expenditure on properly organized rehabilitation services of a sum of money equivalent to that necessary to maintain a disabled man in idleness in an institution for one year will commonly convert him into a productive worker. In a relatively short time of employment he will return to the state through taxation more money than was expended on his rehabilitation. This striking evidence of the economic value of rehabilitation has been observed over and over again wherever the program has been established. In this fashion tax consumers become tax producers. The restored individuals not only produce goods and services but they also consume goods and services produced by others. Hence the economy of the community is strengthened.

Just what is rehabilitation and how can it be achieved? Rehabilitation has been defined as the restoration of the sick or disabled person to the highest level physically, psychologically, socially and economically compatible with his disability. If we examine the problem on an individual basis we shall find that the challenge presented by the patient's environment is just too great a hurdle for him to surmount in his handicapped condition. It thus becomes necessary to modify

the handicap or the environment or both. In practice it frequently amounts to doing what has to be done to get a patient going again.

The chief requirement is good medical planning and integration of not only definitive treatment services, but also of social services, of vocational guidance and counselling and educational programs, and finally of vocational establishment.

Diagnosis must come first and is the keystone of medical management. Following on diagnosis comes definitive treatment. For the locomotor disorder there may be required surgical or medical treatment to minimize the disorder, the provision of artificial limbs or braces, and the restoration of weakened muscles whereby maximum power is restored and useful function is taught. This may include teaching the patient to walk or to use a wheelchair, teaching the activities of daily living or restoring skilled movements to impaired upper extremities.

It may require the assistance of the speech therapist to render communication useful, the teaching of lip reading, the making of dental prosthesis to fill the defect in the cleft palate. Commonly psychiatric assistance is required to modify the disturbed emotional and psychological components so that the patient will be once more, or perhaps for the first time, capable of being integrated into community life.

The modification of the individual is thus carried out so as to ensure the restoration to the highest level of function. Thus the maximum potential will be made available to cope with the problems of living. Unfortunately, illness and disability cannot be eradicated in all instances and the patient may be forced to face the hard reality of permanent disablement.

This leads to the next responsibility of the physician, evaluation. He must be able to assess the patient to determine not only what he has lost but what worthwhile attributes remain. This requires not only a physical evaluation, but also a measurement of intellect, courage and determination, diligence, aspirations and ideals. One must be able to evaluate character.

The assessment must be made in relation to the patient's environment or proposed environment. Thus impaired ability to walk is a very great handicap for a farmer, a bushworker or a bricklayer. Impaired hearing, which would prevent a man from meeting the public, might not be a handicap to a farmer, and epilepsy which prevents one from climbing and driving is not a very great impairment for a bookkeeper. Similarly, age, educational background and the culture to which a man will return may determine the course of planning which leads to employment. The child must be educated and helped to develop into a mature person. This requires a combined effort on the part of the doctor, parents, nurse, therapist, teacher and vocational counsellor, with the child participating. The adult who has completed his education may not require any change of vocation, or he may require a new start. The cultural setting will determine the way in which the disabled person is regarded and received by his associates and therefore the esteem with which he is held. And indeed in some cultures the disabled just do not find a place. Nomadic people have little place for the handicapped. The Eskimo cannot afford to carry any who are not fit as there is no surplus in the economy. On the other hand, modern technological society offers a great variety of opportunity for the physically unfit, for the physical demands are very slight in many vocations. But our society requires mental and emotional stability. The paranoid schizophrenic may be able to follow a trap line successfully but is a misfit in industry.

Evaluation is achieved in many ways. First, the physician gets to know the man as a person. He may require work assessment tests to determine his endurance or dexterity. These may be done by the occupational therapist. The psychologist may be called in to determine intellectual level, emotional stability, the presence or absence of organic deficits and to advise regarding vocational training.

The vocational counsellor must become acquainted with the patient and apply selective placement techniques in which the capacities of the man are matched with the demands of the job. Such a counsellor must know the requirements for workers in industry, the professions and business enterprises, together with the opportunities available in the community. The successful achievement of the vocational counsellor and placement officer in finding a niche for the disabled man or woman is the culmination of the whole process.

All who take part in the program must never fail to bear in mind that the patient is the most important concern at all times and that nothing can be achieved without his complete co-operation and total effort. To assure that the patient will be motivated it is essential that he be an active partner in the program, understanding the general purpose of treatment and accepting the goals established, which requires that they be meaningful to him.

The current problem presented to the medical profession by the host of disabled persons is as great as that posed at the beginning of the century by acute epidemic disease. It requires for its solution that each physician bear part of the responsibility for the restoration of the handicapped. The general practitioner or specialist who has gained the confidence of the patient is in a favourable position to initiate and carry through a restorative program. He should not delegate this aspect of treatment to another physician unless the needs of the patient are such as to require time and facilities beyond his capacity. For the more difficult cases special services must be made available in general hospitals and special rehabilitation centres to ensure that the special requirements of the more seriously disabled are adequately met.

A. T. JOUSSE, B.A., M.D.

REHABILITATION OF THE HEMIPLEGIC PATIENT

J. S. CRAWFORD, M.D., F.R.C.P. (C)*

ONE of the main reasons for the increasing prevalence of chronic disease has been the remarkable strides made in medical and surgical care. The result is not only the prevention of death, but the development of an aging population. In 1900, one person in twenty-five was sixty-five years of age or over. It is estimated that in 1980, the ratio will be one to ten, and one-half of our population will be over forty-five years of age.

Today, the physician's practice consists more and more of disabilities resulting from chronic disease, and without hesitation it can be stated that hemiplegia is the clinical entity most commonly encountered. In Canada alone it is estimated there are approximately 125,000 hemiplegic patients, yet the rehabilitation of these same patients has only been seriously undertaken by the medical profession in the last few years. Until that time it was left to the family, through trial and error, to develop some form of re-training program.

It is not the purpose of this paper to discuss care in the acute stage, but the importance of diagnosis through careful history and examination, before the undertaking of a long term treatment program, cannot be over-emphasized. Without a diagnosis it is impossible to have a prognosis, and with the prognosis in mind, a practical rehabilitation program can be planned.

The following classification of the causes of hemiplegia is suggested as a useful aid in diagnosis. The causes fall under three main headings:

1. Thrombosis
2. Hemorrhage
3. Embolism

*Toronto Western Hospital, Toronto.

Cerebral thrombosis:
- Cerebral arteriosclerosis,
  - associated hypertension
  - associated diabetes mellitus
- Syphilitic arteritis.
- Thrombo-angiitis obliterans.
- Periarteritis nodosa.
- Acute infections of the nervous system.
- Polycythemia rubra vera.
- Profound anemia.
- Pregnancy.
- Cerebral vein thrombosis.

Cerebral hemorrhage:
- Cerebral arteriosclerosis with or without hypertension.
- Congenital malformation of cerebral vessels.
- Extra-dural hemorrhage.
- Subdural hematoma.
- Subarachnoid hemorrhage.
- Hemorrhage into tumour.

Cerebral embolus:
- Thrombosis super-imposed on an atheromatous plaque in the right subclavian artery or right innominate artery.
- Heart:
  - Valvular vegetations
  - Mural thrombus
- Lung:
  - Infected emboli
  - Pulmonary vein thrombus
- Tumour embolus.
- Fat embolus.

In the consideration of the differential diagnosis of the cause of the hemiplegia, pit falls may be avoided if the physician will include a blood Wasserman, estimation of the plasma non-protein nitrogen, a two-hour post prandial blood sugar estimation, and a six foot postero-anterior chest film, when practical, in the standard investigation.

CEREBRAL CORTICAL FUNCTION

Before considering the re-training of the hemiplegic person, I think a brief discussion of cerebral cortical function will be of value and will assist in a better understanding of the behaviour and movement pattern in cerebral cortical disease.

In 1898, Hughlings Jackson stressed the importance of integration of cerebral function, rather than emphasizing neuroanatomy and localization of function. This trend in thought is most important in the rehabilitation of the hemiplegic. The facts regarding cerebral motor function are few, and as Denny-Brown has pointed out, our knowledge of cerebral function has been derived largely from the deductions of function after reviewing the nature of the observed deficit in movement following ablation, or destruction. From the results of such investigation and deduction we can draw several important conclusions that are of practical importance in a re-training program.

1. The rolandic area is the steriognostic apparatus for exploring space. It is a facilitating mechanism under the control of the "will".

2. Cortical paralysis is a depression of motor function rather than true loss of specific movements, or the power of contraction of any particular muscle, and it appears that the mechanism of movement which ultimately recovers from the paralysis has been present all the time, but its origin presumably is taken from a lower level in the brain. These movements are not as complex and as closely co-ordinated as the normal, both in relation to the individual movement and its projection into space. These statements can be best illustrated through cortical ablation experiments on the monkey. Within the first few hours after operation, the loss of motor function is relative, not absolute, and if motivation is strong enough the part will be used. Ultimately, and again depending on motivation, even isolated movements of the individual fingers will return. From this experiment it is concluded that return of motor function is considerable, and the animal depends a great deal on an intact sensorium for his movements.

If we consider the human patient who has suffered from hemiplegia and consider the sequence of return of power, in the early stage, return of upper limb movement consists of adduction and internal rotation of the shoulder, flexion of the elbow, then flexion and pronation of the wrist. Later, adduction of the shoulder can be performed without elbow flexion, then flexion of the wrist can be performed without pronation of the wrist, and then flexion of fingers and even apposition of fingers may eventually return. Motivation too is important in the human as well as in the experimental animal in attempting to develop a functional movement pattern. The sequence of return of movements in the lower extremity is similar to that of the upper extremity. At first gross movements at the hip joint occur, followed by abduction of the hip, flexion of the hip, and later, isolated movement at the knee joint. Plantar flexion of the foot and inversion return much earlier than dorsiflexion and eversion of the foot, and in fact these latter anti-gravity movements frequently never return to a functional level.

It might be concluded that the stretch reflex is the simple segmental response to proprioceptive stimulus and as the brain is reached, this reflex undergoes a series of refinements at the thalamic and cortical levels, and becomes more delicately adaptable, more discriminative, and a more projected motor reaction.

From the studies on the experimental animal and of neuro-pathological findings in the human subject, one is impressed with the fact that the brain is a highly integrated organ and the motor area is influenced to a considerable ex-

tent by other areas of the brain. We might conclude that it is not so much the anatomical localization of the lesion but the extent of the lesion which determines prognosis in relation to time and extent of recovery.

SELECTION OF PATIENTS

As is the case with all patients who seek rehabilitation it is necessary to select cases which are feasible. Their mental state must be such that they are able to retain from day to day the instructions and procedures practised the day before. Obviously, those cases in which the pathological process progresses, so that the rehabilitation program cannot keep up with it, are not acceptable. It must be pointed out, however, that during the first four to six weeks it is unwise to reject or abandon rehabilitation procedures because many patients do not recover from the initial shock of their lesion until this time has elapsed.

PRIMARY CONSIDERATIONS

There are several factors which will influence the effect of a re-training program. Those patients who have frontal lobe damage are the ones who appear to suffer from a loss of motivation and as such will not make use of instructions and demonstrated procedures on their own volition. Secondly, those patients do poorly who suffer parietal lobe damage with resulting lack of awareness of an extremity.

Those patients who are able to activate the quadriceps muscle and have some return of power in hip abductors will in all probability be able to walk. Those patients who have return of some finger movement early in their disease will do well in a rehabilitation program.

SECONDARY CONSIDERATIONS

The basic personality of the patient will not change appreciably after his stroke. For example, the person who was aggressive will continue to be so in his re-training period. The placid, dependent individual can learn to make use of his disabled limbs but frequently becomes more dependent with each succeeding day. The self-centred, selfish person may become more demanding and irritable if he does not get his own way.

AIMS OF TREATMENT

1. To restore function through active exercise and bracing.
2. To minimize disability and prevent contractures.
3. To restore to previous social environment.
4. Failing the above, to make the patient as independent as possible and to minimize the work carried out by those performing nursing care.
5. To prevent complications of prolonged bed care: pressure sores, protein catabolism, dehydration, genito-urinary infection, and osteoporosis.

TREATMENT

It has been our experience in The Toronto Western Hospital that there will be no untoward results in a patient who has suffered his hemiplegia through thrombosis or embolism if he is started on bed activities after the first twenty-four hours. In those patients where hemorrhage has been the cause of the disability, bed activities alone are carried out for the first three weeks and not until then is an ambulation program and active training started. One of the first procedures to be instituted is the use of fracture boards under a sponge rubber mattress. Not only does this make nursing care easier and allow less restriction of movement in the bed, but it also minimizes pressure sores.

The first procedure to be carried out by the rehabilitation team is a comprehensive muscle test. This is used as a base line on which improvement can be evaluated. Range of movement of joints

are then noted and following this the patient is given an "activities of daily living" test, which includes some fifty basic activities. These include his ability to procure objects from the bedside table, to get from his bed to the chair, from the chair to the standing position, to eat his food, clothe himself, and lace his shoes. Those activities which the patient is able to perform are checked off, as well as his ability to perform them independently or with the assistance of others. The unfilled blank spaces indicate the activities which the patient must learn to perform in order to return to an independent life.

Other basic procedures consist of the use of a well moulded, posterior, plaster splint, extending from his toes to above the knee. This assists in the prevention of a foot drop, Achilles tendon and tibialis posterior tendon shortening, and resultant equino-varus deformity which is difficult to overcome in later months. A small pillow is placed in the axilla, and daily passive movement of the shoulder joint is carried through a full range of movement to assist in the prevention of the fixed shoulder adduction deformity. A simple anterior hand splint moulded for each patient is better than a simple slab splint for the prevention of wrist and finger flexion contractures and over stretching of the extensors of the wrist and fingers.

A bowel training program is started as soon as the patient is aware of his surroundings. This consists of the insertion of one or two glycerine suppositories into the rectum at a definite time each morning, and through the simple reflex of stretching the rectum, a bowel evacuation will usually occur within one to two hours. This procedure is continued for several weeks until the reflex action occurs with clock-like regularity. It is so important that the development of this reflex action is recorded on specially prepared charts. In some cases it may be assisted with the use of a mild laxative the night before. During the early stage, incontinence and wet bedding are avoided with the use of a two-way drainage catheter, then tidal drainage. In hospital, cystometrography is carried out each week to determine the physiological response of the bladder distension, and usually within ten days to two weeks the catheter may be clamped for two hour periods and then removed, and the patient is then offered a urinal every two hours. Gradually this period is extended. The result of this co-operation between the medical and genito-urinary service results in the insertion of a catheter for an adequate period of time but it is not left in too long. To ensure adequate fluid intake a fluid balance sheet is kept on all patients and an intake of 2500 c.c. of fluid daily must be insisted upon.

The physiotherapist, from the beginning, is conscious of the fact that contractures will develop quite easily and she carries all joints of both the upper and lower extremities through a range of passive movement. As soon as active power is present, active assisted movements are carried out. One of the earliest active movements stressed is quadriceps tensing in bed, then active quadriceps exercises sitting on the side of the bed.

As soon as some semblance of active movement develops, an overhead bed bar is attached with the suspended hand gripper. This too allows the patient to be more independent in bed movements. At the same time a pulley is attached to the head of the bed through which a rope may be tied to the hemiplegic arm. The other end is grasped by the good arm, and the patient is then able to carry out his own shoulder exercises and maintain a good range of shoulder movement. Although it is important to start ambulation as soon as possible, it is a wasted effort for the patient to be placed in a chair and allowed to develop a slumped

posture from poor muscle control. In fact, it leads to the development of abnormal muscle stretch and further weakness. As soon as the patient has regained sufficient back and abdominal muscle control to sit on the side of the bed and support himself, balancing movements are carried out to assist in the development of proprioceptive impulses leading to a knowledge of his position in space.

At this stage when the patient is able to sit and balance, an aluminum wheelchair is preferred to the comfortable bedside chair. This gives better back support. To the chair, an overhead sling suspension frame is attached (Fig. 1). The suspension is through heavy elastic; it maintains the affected arm in the semi-abducted and internally rotated position. It allows a certain amount of movement. A lapboard is placed across the arms of the chair, and the arm is suspended just clear of the board. With this prosthesis it has been found that the patient can use the hemiplegic arm much earlier, and at this stage as a stabilizing member. The practical significance is that the patient can now feed himself and carry out a certain amount of his facial and mouth care without assistance.

FIGURE 1.—Aluminum Wheelchair with Lapboard and Sling Suspension.

As soon as the patient has developed reasonable control of his quadriceps, hip extensor, and abductor muscles, he is progressed from the sitting to the standing position, for brief periods at first, and always with one or two attendants to prevent the effects of postural hypotension. Balance activities are started all over again in this new position, either at the bedside between two chairs, or between the parallel bars. The patient is encouraged to view each activity in front of a full length mirror at either end of the bars. As soon as sufficient balance is developed, gait training is started.

About 75% of patients with involvement of lower extremities will require some form of brace to overcome the foot drop. A double spring type of support is preferred to the heavy double bar type (Fig. 2). The latter only is used where there is marked spasticity. This type of brace should be fitted before gait training is started to prevent the swinging, slapping, type of gait characteristic of those hemiplegic patients who are trying to overcome their foot drop.

After the acute phase of the illness is over, a certain period of the day is set aside for teaching activities of daily living. In hospital this is carried out largely by the nursing personnel. It is much more useful for the patient to be able to get from his bed to his chair or wheelchair, to sit, or to carry out toilet

FIGURE 2.—Foot Drop Brace.

facilities independently, than to spend long periods of time walking up and down the ward. Only when these activities are accomplished to the best of his ability is walking stressed. Patients who do not regain finer co-ordinated movements of the affected upper extremity can be taught quite readily to tie a bow in their shoes with one hand. Those who cannot master this simple procedure are supplied with zipper laces, which can be purchased through many shoe stores.

At a very early stage of the rehabilitation program, speech therapy should be initiated. It is essential that the family be made aware of the speech defect and that it is not a manifestation of loss of intelligence, and that through patience and proper guidance it can be greatly overcome.

For the patient who is hospitalized, it is of practical importance to determine early in the treatment program who is the member of the family responsible for the home care of the patient. This person is then made aware of the rehabilitation program and actually allowed to participate in it. He or she then becomes much more interested in the care of the patient and is more anxious to participate in the same program in their own home surroundings.

Once a patient is discharged from hospital, a follow-up home program is important to ensure that the procedures and activities learned in hospital are adapted to the home situation.

Although the above program is simple, it is practical, and if carried out will result in a diminution of the complications which were previously seen in patients who suffered from this disability. It will allow many to lead an independent life. It will ease the nursing care considerably on those who will be required to look after patients with extensive cerebral damage.

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REHABILITATION OF THE INJURED WORKMAN

Prepared by

THE ONTARIO WORKMEN'S COMPENSATION BOARD*

LAST year there were 120,000 accidents, or roughly 900 each working day, reported to the Ontario Workmen's Compensation Board. With increasing population, broader Compensation coverage, and our volatile industrial expansion, this figure will probably double in the next ten years. It follows that the rehabilitation of the injured workman will become an even larger social and economic problem. A challenge is thus presented to the medical profession which cannot be brushed aside. Rehabilitation becomes a living, vital force in our way of life.

The policy of the Workmen's Compensation Board has gradually changed from a purely legalistic system to a biological or clinical one. Our true objective lies in returning a disabled workman to employment as quickly as possible with a minimum of permanent impairment. This, in effect, means that successful rehabilitation of the injured workman is the end point or target of the entire Compensation process.

What is being done? What has been accomplished in this important field? The rehabilitation of the injured workman, the hemiplegic or the alcoholic presents a complex problem. Teamwork, so essential in all forms of medical therapy, is tremendously important in this particular field. It takes a good many people in many spheres of activity to accomplish the task of returning an injured workman to a normal and healthy place in his social structure after he has been dislodged from this structure by industrial accident or illness. Teamwork must be managed and co-ordinated to become truly effective. Successful rehabilitation is a continuous process from the First Aid Station to the return of the weekly pay cheque. Any break in the continuity of this process means delay, waste of manpower, financial loss and insecurity. Saving lives and partially restoring broken limbs are important incidents in the treatment of disease and injury. Our skills and efforts are wasted, however, if the patient's future is wrecked in the process. Rehabilitation has been termed the third phase of medicine. Surely it should be the primary and guiding principle in the treatment of disability. Who is better trained and more adequately equipped to handle, guide, and co-ordinate this fundamental service to humanity than the physician or surgeon?

In former years little attention was paid to the necessity for accurate diagnosis and the grouping and classification of patients who would require help in adjusting their lives following injury or disease. Lack of appreciation for this need has led to a serious breakdown and retrogression in the rehabilitation process. Amateurs, no matter how well they may be motivated, have little place in this new scientific field. In our experience, approximately twenty per cent. of the seriously injured industrial workers develop difficult rehabilitation problems before they reach the stage of repossessing self-assurance and self-respect. They need help and guidance by well-qualified professionals before they can again resume their rightful place in society. Sound, scientific diagnosis,

*Dr. E. C. Steele, Commissioner; Dr. B. H. Young, Superintendent of Malton Rehabilitation Centre.

rather than empirical treatment, must be the working basis, if we as doctors and students are convinced that successful rehabilitation and replacement in industry is the goal for which we are striving.

In the past two years we have been attempting to analyse critically our failures; and by failures we mean those injured workmen who, despite our best efforts, end up in the industrial scrapyard of unproductivity. The majority of our failures can be traced to insufficient study and inadequate assessment of the individual and his related problems at the beginning of the rehabilitation treatment phase. Proper assessment and, hence, practical therapy and placement can only be approached by first having a detailed knowledge of the man's previous work history, his educational background, personality traits, and his individual fears and hopes—in short, a complete social history. This history must be augmented by a detailed physical and psychological examination, making use of the services of highly skilled and trained specialists in various fields to interpret functional capability and prognosis. Actual work-testing under professional observation is an important technique which provides valuable information.

For the former truck driver with a useless arm, a new vocation must be found, entailing weeks of research, aptitude testing, vocational guidance and vocational training. He must be stimulated, bullied and encouraged if he is again to become a useful citizen in his community. Diagnostic assessment carried out by medical experts should be followed up by a corps of dedicated professional therapists including physiotherapists, occupational therapists, remedial gymnasts, social workers, limb fitters, vocational experts, psychologists, and industrial placement officers. Diagnostic assessment and treatment carried out by this team is the key that will open the door to successful rehabilitation and placement in industry. The over-all supervision and co-ordinating influence should be under the jurisdiction of a sympathetic and understanding physician.

A recent survey throughout industry in Ontario has shown that employers are very sympathetic and eager to assist in the employment of the handicapped. This healthy attitude must be stimulated and encouraged by meticulous preplacement planning, conditioning and training for the job. It has been proven without doubt that handicapped workmen properly trained and motivated and selectively placed are loyal, efficient and productive employees. The converse is equally true.

The capacity of our Malton Rehabilitation Centre is five hundred patients. These men all have traumatic injuries of various types and severity. Primary grouping and early assessment based on the severity of the lesion fall roughly into four categories:

Group 1 consists of those patients with fairly severe soft tissue injuries or major fractures not involving joint surfaces. The basic need in this group is to prevent deconditioning by activating muscle power and encouraging constant supervised use of weakened limbs. The patient's main need is a properly integrated physical restoration program, consisting of physical therapy, graded active exercise, heat, massage and hydrotherapy, where indicated, plus occupational therapy of a specific functional nature. A remedial gymnastic program for group exercise and a toughening program of remedial games are essentials. This group will have little or no permanent disability if properly handled, and in all probability each man will return to his former employer or, if to a

new one, he will continue to do the same type of work, using his previously acquired skills.

Group 2 consists of those patients with severe injuries involving soft tissue, disc lesions, amputations, head injuries and the like. This group requires a similar physical restoration program to ensure maximum physical fitness. The men can usually return to their former jobs, provided some modification in the working environment is made. For example, an outside carpenter may become a bench man. To accomplish this requires a detailed knowledge of industry and close liaison and co-operation with prospective employers.

Group 3 consists of seriously injured workmen who obviously from the beginning of treatment will never be able to return to the former type of employment; e.g., a locomotive engineer who has lost an eye. As is the case with the former groups, a physical restoration program is essential. Complete psychological and vocational appraisal is necessary before re-training is undertaken. Following formal or on-the-job training, these patients will be equipped for proper placement in gainful employment.

Group 4 consists of those injured workmen, fortunately comparatively few in number, who despite obtaining the maximum benefits of a medical and vocational rehabilitation program are still unable to return to employment under ordinary industrial conditions; e.g., some paraplegics, double amputees and psychotics. This group will require employment in sheltered workshops or home-bound employment facilities.

Long years of experience have convinced us that the rehabilitation of injured workmen is an economically sound principle. A comparative statistical study of industrial injuries throughout the United States and Canada shows that Ontario has the lowest percentage of permanent disabilites. Good definitive medical care plus an active rehabilitation program have made this possible. We predict that in future years rehabilitation techniques will become a more active and potent force in medical practice.

PHYSIOTHERAPY IN CHEST CONDITIONS

MISS J. GRASSIE, 5T6*

THIS article is concerned with the use and value of physiotherapy in the treatment of chest conditions. These conditions, particularly those requiring surgery, are prone to various complications. When wisely used, physiotherapy can assist effectively in the prevention or treatment of these complications. The therapist should be familiar with the anatomy and physiology of the respiratory system and with the pathology of its diseases. She should also be aware of the outstanding signs and symptoms of these disorders. I have not attempted to describe in detail the various techniques of treatment used by physiotherapists in such conditions, but more to present the principles.

Physiotherapy is concerned with teaching the patient to recover function after disease or injury, and with preventing dysfunction during the recovery period by dealing where possible with the complications which may arise.

As respiration is, in part, a voluntary function, the respiratory mechanism can be educated, before and after surgery

*III Year, Physical and Occupational Therapy.

as pneumonia, pleurisy, empyema, and lung abscess, physiotherapy is of little value, but in the later stages of recovery it has a very useful plaee in the treatment program.

In ehronie bronehitis, emphysema, asthma, and bronchiectasis, the fullest possible respiratory function is taught with emphasis on the specific needs and possible complications of each patient. Relaxed expiration and inspiration are emphasized for the asthmatic patient, while postural drainage and percussion are added to the treatment of the patient with bronchiectasis.

The cases of thoracic surgery most frequently encountered by the physiotherapist are: lobectomy, thoracoplasty, pneumonectomy, and thoracotomy for drainage. Physiotherapy is helpful before and after these operations to aid in a quicker recovery and to prevent such post-operative complications as atelectasis, thoracic deformities, and limitation of arm movements. In abdominal surgery physiotherapy can be useful in preventing ehest complieations whieh may arise after the operation. Pre-operatively the therapist ean be of eonsiderable help by gaining the patient's eonfidence and helping to allay his fears and explaining his post-operative treatment to him.

Before beginning any treatment of chest conditions the therapist carries out a routine examination to determine: the general health of the patient, his vital capacity, extent of thoracic mobility, range of movement in joints of the spine and shoulder girdle, the presence and degree of thoracic deformity, presence of a cough and the type of breathing. From this examination, the case notes and X-rays, the therapist should be aware of the conditions and the specific needs of the patient to plan her treatment effectively.
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Surgical Conditions

Pre-operatively, the aims of treatment of the physiotherapist are mainly prophylactic in nature and are a preparation for post-operative treatment. They include the following:

1. Increasing the vital capacity and thoracic mobility.

Expansion of the thoracic cage and full excursion of the diaphragm are necessary to increase the patient's vital capacity, and to loosen mucous secretions, thus permitting more complete evacuation of these secretions. Localized expansion and control of the chest, if gained before the operation, may be carried out post-operatively where required to permit expansion of the lung, to prevent adhesions, or to control paradoxical breathing.

Because of the possible danger of atelectasis after a thoracoplasty, it is most important that the patient learn to use the unaffected areas of lung to their maximum. Breathing exercises are practised until the patient can easily control all areas of his chest.

2. Draining the area of secretion.

The patient should be taught to cough effeetively and productively with the least possible effort to clear the bronchial tree of mueous seeretions. If the mucous is viscid and lodged deeply in the smaller tubes with no air behind it, other measures such as breathing exercises, thoraeie pereussion over the affected area, agility exereises where the patient's condition permits, and postural drainage should be instituted. Postural drainage is very helpful prior to a lobeetomy for bronchiectasis as the lung should be as dry as possible to prevent displacement of pus, ateleetasis and spread of the infection.

3. Teaching post-operative exereises.

Serious deformities of the head, shoulders, spine and thorax may result

following thoracic surgery, particularly if the patient has had a long period of bed rest prior to the operation. The patient will probably be reluctant to perform full range arm movement and will unconsciously adopt the position which lessens the strain on the incision. Exercises are given to strengthen the postural muscles and to train the postural sense so that correct posture becomes automatic and the patient can easily recognize and correct his faults. The treatment of limited arm movement is more effective post-operatively if these movements have been taught before the operation. Relaxation, to overcome the post-operative tendency to keep muscles tense, must be taught first.

Post-operative physiotherapy

After the operation physiotherapy can be started as soon as the patient regains consciousness, if his condition permits. The patient is now ready to put into practice what he was taught pre-operatively, including:

1. Increasing thoracic mobility and vital capacity.

It is most important that, for the first week, treatment should be centered on diaphragmatic breathing and expansion of the lungs to prevent atelectasis. Normal bilateral co-ordinated chest movements will occur if expansion exercises for each part of the affected side are practised separately. This will also prevent scoliosis and help gradual further expansion of the sound side. Diaphragmatic breathing is important after a thoracoplasty as the breathing tends to become rapid and shallow. In empyema, if re-expansion of the collapsed area does not occur automatically, breathing exercises commenced immediately after the operation are often useful.

2. Aiding expectoration.

The methods of draining secretions as described in the pre-operative treatment can also be applied after the operation. The main indication for postural drainage is a tendency to post-operative atelectasis. This form of treatment may be required in cases of pneumonectomy for bronchiectasis, but is not necessarily routine for a thoracoplasty. In an empyema or a lung abscess postural drainage is invaluable in facilitating the movement of secretions.

3. Prevention of spinal deformity.

The patient has been acquainted with the post-operative exercise program so that he is fully aware of what is expected of him at this point. Immediately after the operation the therapist passively begins to correct the patient's posture and later he participates actively. The patient must learn to "feel" the correct position.

4. Prevention of a stiff shoulder.

The same program as presented in 3 may be followed in this aspect of treatment.

5. Improvement of general health.

Although this is mainly the concern of the doctor, the physiotherapist can help both before and after the operation by courses of ultra-violet radiation and light general exercises within the patient's tolerance.

Medical Conditions

Acute

Physiotherapy is rarely used in acute medical conditions but can be of value in some cases by:

1. Increasing thoracic mobility.

As in surgical conditions, this is one of the most important goals of the physiotherapist and can be accomplished by various types of breathing exercises, which help to overcome the limitation of movement caused by pleural adhesions and fear of pain. Localized breathing exercises help to equalize the expansion of both lungs, and general thoracic

mobility and circulation can be improved by double-sided expansion exercises.

2. Aiding expectoration.

There are two chest conditions in which it is necessary to remove secretions and exudate. These are unresolved lobar pneumonia and lung abscess. The therapist supervises the postural drainage and studies the X-rays carefully to choose the best possible positions for effective drainage. Thoracic percussion may help the pus to drain if it is thick.

3. Improvement of general health.

Because of the severe degree of toxemia and the long period of bed rest, the general musculature of the patient will need strengthening before he gets up. Special attention is given to the postural muscles and activity is allowed to progress within the limits of fatigue. Ultraviolet radiation may also be used.

Chronic

Physiotherapy plays a much more prominent role in the treatment of chronic medical conditions. The methods of treatment include:

1. Increasing thoracic mobility.

Loss of the elasticity of lung tissue, pleural adhesions, or spasm of the bronchiolar muscles may limit thoracic mobility and can be helped by breathing exercises. This is particularly true in chronic bronchitis, asthma and emphysema. Full expansion may be hindered by limitation of movement of the thoracic joints. Mobilizing exercises, consisting of simple, easy, relaxed movements, should be given according to the general condition of the patient.

2. Teaching full use of respiratory system.

Breathing exercises are used to teach the patient full use of all areas of the lung, concentrating mainly on those parts not being used. To expand the large basal areas of the lung, diaphragmatic breathing is taught, progressing through various positions, until it becomes a habit. This is important in cases of emphysema and asthma. The essential aim of treatment is to gain good breathing habits in the activities of daily living. The amount of exercise is gradually increased and the patient is carefully trained until he can use any part of either lung at will.

3. Teaching relaxation.

The art of relaxation requires careful training by the physiotherapist and is necessary in most chest conditions, as there is usually general and local hypertonicity. Once breathing has been improved, full relaxation of the neck and shoulder girdle can follow. Relaxation is important to the patient with chronic bronchitis, who must learn effective use of the diaphragm to gain more expansion of the basal areas of both lungs. To the adult asthmatic, who is always tense and anxious, general and local relaxation is essential.

4. Correction of posture.

In chronic medical conditions poor posture may result from impaired lung action, and the same principles and methods of treatment may be used here as in surgical conditions.

5. Aiding expectoration.

Once again the same principles and methods may be used as in surgical conditions. In cases of chronic bronchitis, postural drainage is necessary if the mucus becomes excessive or tends to plug the small bronchi. This type of treatment is also essential to the patient with bronchiectasis and must be carried out daily for the rest of the patient's life. The positions must be carefully chosen and taught to the patient.

6. Improvement of general health.

Once again physiotherapy can help to raise the patient's exercise tolerance by

carefully graded activity. As general muscle strength improves so will posture, general health and well-being.

SUMMARY

The techniques of physiotherapy if used wisely and skilfully can be of great assistance in speeding the recovery of the patient with a chest condition and in preventing post-operative complications. Early treatment is essential.

Physiotherapy is a relative newcomer to the field of medicine and must still prove its worth in the treatment of certain conditions. As knowledge of its techniques and uses becomes more universal, the physiotherapist should prove to be one of the strongest and most important allies of the physician and the surgeon.

OCCUPATIONAL THERAPY IN THE PSYCHIATRIC HOSPITAL

M. T. SAMUEL, 5T7*

MENTAL illness has been described as "the unsuccessful effort (of the individual) to maintain some measure of emotional equilibrium in the face of internal and external stress." To attempt to cover adequately in one paper the use of occupational therapy in the vast field of mental disorders would be as impossible as to do so in the field of physical disabilities. Thus it has seemed best to limit this discussion to certain basic concepts of patient needs, and to frequently used ways and means of meeting them in occupational treatment. In so doing, it has been inevitable that we omit other than brief references to any of the specialized programs in the increasingly important areas of research, the convulsive therapies, and the prefrontal leukotomies. Each of these is a story in itself.

The purpose of this article then is to consider the function and scientific use of occupational therapy in the field of psychiatric problems. Perhaps the most necessary task, as well as the most difficult, is that of correlating the events and procedures which occur in the occupational therapy situation with those which are generally referred to as psychiatric treatment and psychotherapy. Activities and procedures utilized must be the result of the best possible evaluation of each patient in accordance with established psychotherapeutic goals. Because occupational therapy is a definite treatment, certain objectives must be kept in mind.

Since psychotherapy is concerned with affording the patient a therapeutic experience in terms of his emotional needs and drives, then occupational therapy should be concerned with providing such opportunities. The means available in the occupational therapy situation are, first, the interpersonal relationship between therapist and patient, and second, the activity. Therefore the objective of therapeutic expression of needs and drives is attained by means of a therapeutic interpersonal relationship and some form of therapeutically beneficial accomplishment, both of which can be manipulated according to the needs of the patient. The occupation or activity is not the primary end in itself, in the same way that shock therapy is only a means to the end.

*II Year, Physical and Occupational Therapy.

Motivation of the patient is a frequently mentioned goal of occupational therapy. This is more than the altruistic desire to establish in the patient "the will to get well." Of course this is a valid goal, but as a general and abstract objective it can be activated only by becoming more specific. Motivation should be the product of the other objectives mentioned if they are correctly applied.

If occupational therapy is to augment psychotherapy and increase its effectiveness, it must involve more than just a contact with the patient. It must extend further than the teaching of a skill, further than the providing of creative activities, a pleasant attitude and a diversion, for such a non-specific approach to the problem can apply anywhere without any professional understanding of the individual patient. *Diversion* is only an aid to repression, in that it simply directs mental energies elsewhere. The effect of the occupation on the patient himself is frequently ignored, and the concern is with the product. When occupations are used with this as their only objective, they may have a secondary use in institutional maintenance. In the case of certain so-called chronic patients, the word "maintenance" refers to the patient as well as the institution.

Group therapy can be used effectively and to an economic advantage in the psychiatric hospital. It has been found that the use of groups is most effective for those suffering from functional psychoses. The aim of treatment with these people is directed mainly at "strengthening the ego, so that it need not retreat from reality, but rather grow able and willing to cope with it." Therefore it is the situation which helps to activate outward interest that is useful here. Participation in activity brings the patient in contact with reality and with other patients. In a group situation, patients are given a better chance to influence and often to help each other. The psychotic has difficulty with his relation to other individuals, so that the impersonal milieu of a group and the indirect relationships in common activity are essential transitions. Thus, groups, and activities in groups, serve to "socialize" the patient. Occupational therapy is therefore performing an important function by creating possibilities for social interaction. Even the withdrawn and delusional patient who prefers an individual occupation can gain much from pursuing activities in the presence of others. This person may respond more readily in a situation in which he feels the group expects him to join them and if he is unaware that anyone is giving him special attention.

The patient should not be forced into accepting a social role until he is capable of meeting the challenge. Socialization can only be obtained by first allowing the patient to relate to persons and activities on his own level of tolerance, and by achieving the primary psychotherapeutic goal of dealing with the basic emotional needs of the individual. "Surroundings in which the atmosphere is intellectually stimulating but not subject to social pressures has definite therapeutic value." In this type of situation a good therapist must be tolerant, friendly, tactful and patient, and should encourage spontaneous co-operation.

Group discussions help to direct the patient's thoughts away from his personal problems to the universal problem of the adjustment of the individual to the environment. By so identifying the patient's conflict, he is given courage to try to work out a solution by adopting a constructive attitude. Here it may help the patient to realize that failure can be a means of growth. Groups serve to rouse the psychotic out of his haze, give him a motive for improving, and generate his interests in some aspects of reality. It

seems that "relationship is the pivot of treatment" since it teaches self-understanding.

Creative achievement may assure one of group identification, since patients who stand out in any one skill are called upon by others for help. Such interaction and relationships are the aims and means of occupational therapy. When the aim of treatment is to combat the psychotic's withdrawal, the patient can gain greatly from a setting in which isolated and individualistic occupations are turned into group efforts. This procedure, however, is not advisable for the patient who is constantly placing himself in a consciously competitive situation. A situation in which he can excel can be arranged by introducing a unique project.

Good production or sustained performance by the patient does not always mean successful treatment. The patient may perform either because of his need to comply, or because he feels that it is expected of him. When participation results from these pressures, one can lose sight of the patient's real needs, and little more is accomplished than technically good projects or reinforcement of the therapist's ego. Some patients may hide behind the protection of activity. This mechanism occurs when a patient gains satisfaction out of fantasy time. "They reply to their thoughts as they reply to their hallucinations." For these patients, activity must be on a tangible and constructive level or energy will be directed destructively by indulgence in fantasy. By changing the occupation, the patient has to approach the therapist for direction. This encourages mental and emotional response. Participation may be effective even on a lower level if necessary in such an activity as a rhythm group. An interesting research project in this area was carried out in 1954 in Montreal.

Frequently, "activities in the clinic situation are used by the therapist as a crutch in the initial contact with the patient." This initial contact is perhaps the most important session occurring in occupational therapy. It is not easy to receive the new patient and discuss occupational therapy with him without implying pressure to do something. The manner in which this is handled will determine, to a great extent, the day-by-day developments and the final results of therapy. Because of the nature of occupational therapy, it is relatively easy to fall into the common mistake of stressing the activity over and above the interpersonal relationship and the total situation. The danger of stressing the project rather than the patient is well illustrated in the following case of schizophrenia. When the patient first attended occupational therapy she was fearful, confused and uncommunicative. She avoided every contact by hiding under tables or in closets. After two weeks in the clinic she chose a chair to sit in and the therapist began to discuss a project with her. As she was fearful, insecure and indecisive, a project involving repetition, few variables and a non-resistive medium was selected. Praise and encouragement were given at every opportunity to give the patient a feeling of security and worthiness. She soon became more responsive. Her work was displayed before others and received much favourable comment. But the patient began to show dissatisfaction with the project, and in spite of reassurance from the therapist, she attempted to change some of the work. The project was ruined and the patient refused to return to occupational therapy. The mistake here was excessive praise of the project. Too much attention and concern had been focussed on the project and the patient's performance, rather than on the patient and her own personal integrity. She had seemingly been accepted and recognized not for herself but for the project.

The patient's choice of an activity may be revealing. Reasons for his choice depend to a great extent upon the character of the occupation and how it fits in with the personality of the patient. The expressed interest in a particular activity may be a manifestation of his emotional problem. In some cases, if the therapist goes along with the "interest," neurotic or psychotic behaviour may be reinforced. So when this patient chooses his own activity he is unlikely to be prescribing therapy for himself, or seeking a healthy mode of expression. After all, the individual has been hospitalized because he has been unable to handle his emotional needs in an acceptable way.

The type of motion which the patient likes to perform is also related to his psychiatric status. A manic patient or one with expansive ideas will find difficulty in applying himself to a repetitive job which uses small-range muscular motions, and which does not give obvious signs of work progress to demonstrate to others. On the other hand, an obsessive person may be frightened by large scale physical activities. One such patient was unwilling to do woodwork because hammering and sawing required "such big, bold strokes." Weaving on a small table loom for example is ideal for the obsessive-compulsive patient, because the rhythm, repetition of motion, and the organized pattern of activity does not demand creativeness, originality or "asserting oneself." The chances of failure are reduced as the necessity for making decisions is minimized. Weaving gives this patient an opportunity for expression in a moderate, controlled manner. Treatment aims are met therefore, as there is constructive expression of repressed hostility, and an opportunity for the establishment of obsessive-compulsive performance satisfying to the patient. As the patient responds favourably, a more challenging occupation should be suggested, such as rug-making. This requires a more resistive medium, and provides an outlet for obsessive-compulsive performance, and allows the patient to be at a table with others. Some judgment is involved; he is no longer dependent on the therapist for decisions and guidance but rather for approval of his own self-direction.

Summary

If the occupational therapy is carefully planned, the patient can be given the opportunity to express his needs, drives, attitudes and feelings in a constructive, meaningful manner. These expressions occur symbolically in painting, hammering, and beating a loom and serve to diminish anxiety and tension. What occurs is an unconscious expression in respect to the activity within the patient-therapist relationship. Thus the process is "from constructive expression or sublimation; to therapeutic diminution of needs and drives; to emotional adjustment." Every effort is made to raise the level of integration in the patient in the hope that he may respond to the psychotherapy offered by the psychiatrist. If this is impossible then effort is directed to helping the patient to retain a broad attention span and to forestall further deterioration. Industrial assignments, if therapeutically supervised, can be used effectively in the latter situation as well as for the patient who needs further stabilization in the sheltered environment of the hospital, before discharge. By approaching patients on an objective level they can begin to think in terms of reality. "Something concrete that the patient has made himself is a symbol of actual flesh-and-blood life, a contrast with the still intangible and unsubstantial fantasy and perhaps a temptation away from it." Participation leading to accomplishment, be it through manual work, music, recreation or cultural media, strengthens self-concept, self-

tolerance, and finally, reintegration. "Hospital patients come thinking "I" and "me." They should leave thinking "we" and "us." (Dr. G. H. Preston, 1942)

No matter how infantile the patient's behaviour, he should always be treated as a mature adult. By displaying trust in the patient, and expecting the best from him, a better response is encouraged. When a patient comes to the hospital, he is apprehensive and fearful. A good therapist will try to (1) recognize the individual's good traits or assets, (2) understand his liabilities and frustrations and (3) strive to bring out the best in him, by accepting him and helping him strengthen his inner resources.

Direct psychotherapy is offered by the psychiatrist but the therapist must know the purpose of psychotherapy and its implications, and how to use it within her field and capability. When considering the verbal aspects of occupational therapy, there are four important factors with which the therapist should be familiar on the basis of discussion with the psychiatrist. These are: the amount of talking that the patient does, the people with whom he talks, the kind of things about which he talks, and whether he relies greatly on guidance and advice or whether he is more likely to insist upon his own decisions and independence. It is not for the therapist to decide the specific cause of the mental illness of her patient for this is not within her professional sphere. The therapist is concerned with the management of the manifestations of the disorder and the occupational therapy program is modified according to the symptoms and the stage of the illness. Rehabilitation can be effective only under psychiatric supervision.

Conclusion

Occupational therapy serves in the psychiatric hospital by functioning as (1) a supplement to other forms of therapy, (2) an aspect of psychotherapy, (3) a diagnostic aid, (4) a prophylaxis against deterioration, and (5) an area for research.

Acknowledgment

I would like to acknowledge with deep appreciation the suggestions and help offered to me by Miss H. P. LeVesconte, Senior Lecturer in Occupational Therapy, University of Toronto.

SYSTEMIC REACTIONS FOLLOWING DRUG THERAPY*

B. LANGER, 5T6

DURING the last few decades a remarkable change has taken place in the picture of therapeutic medicine. Discoveries have been made one after another of new antibacterial agents, sedatives, antiarthritic drugs, organ extracts and hormone preparations. The modern physician, instead of having to tax his skill in combating a disease process with a few time-honoured weapons, now has available a huge armamentarium of potent drugs from which to choose. This array of new drugs has done much, of course, to decrease morbidity and mortality in many diseases; however there is no rose without a thorn, and with the increasing number of drugs being used there is a parallel increase in the number of drug reactions appearing. This has stimulated investigation into the nature and means of prevention of these reactions, but thus far our knowledge of this subject is meagre.

Even a satisfactory definition of a drug

*From a paper presented before A.O.A. Honour Medical Society.

reaetion is hard to come by. One that suffiees for most purposes is: "an undesirable effeet differing from a pharmaeological or toxic effeet, produced by a therapeutic or subtherapeutic dose of a drug in a small pereentage of exposed individuals." The meehanism produeing such an effect has been demonstrated in many cases to be allergic in nature, that is, based on the produetion of a speeifie antibody to the drug itself or to some drug-protein eomplex. In other cases the elinical pieture is suggestive of such a mechanism, but proof is laeking. Other meehanisms likely exist and several have been invoked to explain phenomena such as the Herxheimer reaetion, pseudomembranous eolitis, superinfeetion reaetions and drug "idiosynerasy." These are in the minority, however, and the feeling is that most drug reactions as defined are allergic in nature.

Skin manifestations of drug reaetion are commoner than systemie manifestations; however the systemic reaetions are more significant from the point of view of morbidity and mortality. They are generally more dangerous first beeause of the more severe nature of the pathologieal process involved, and second beeause they are not visible to patient and physieian as the skin reaetions are, and tend to elude early diagnosis. The systemic drug reaetions will be diseussed under the following headings:

I. Hematologie reaetions
II. Serum sickness pattern
III. Anaphylaetic shoek
IV. Collagen disorders
V. Hepatitis
VI. Asthma
VII. Neuritis

I. Hematologic Reactions

A. granulocytopenia

Granulocytopenia is easily the most frequently encountered of the drug-indueed blood dyscrasias. A signifieant granuloeytopenia is generally eonsidered to be one which causes the total white blood eount to be depressed below 3000/eu.mm. Agranuloeytosis is a more severe form in whieh there is eomplete or almost eomplete absence of granulocytes in the blood.

The onset of a granulocytopenic drug reaction is aeute, as eontrasted with toxie granulocytopenia following such drugs as aminopterin and nitrogen mustard, whieh is gradual in onset. The meehanism of this reaetion has been at least partially elueidated. Agglutinins have been demonstrated in vitro in the blood of some sensitized patients and it is thought that these are formed in response to a drug-granulocyte eomplex whieh acts as an antigen. Whether lysis oecurs in vivo or the agglutinated cells are removed by some other mechanism is not known.

The peripheral blood in these eases is normal exeept for the scarcity or absenee of granulocytes and often slight depression of lymphocytes. The bone marrow demonstrates absenee of mature elements of the granulocyte series. This marrow picture has been called "maturation arrest", but this term is a misnomer since this eondition probably results from removal or destruction of the mature eells and not through any effect on their maturation.

A lowered white count in itself does not produce any physieal signs or symptoms; it is the infection which may supervene because of decreased host resistance that is the chief danger. There is wide individual variation in the degree of granuloeytopenia which will be tolerated before the patient sueeumbs to infeetion. The early symptoms are usually sore throat and fever due to invasion by baeteria normally present in the mouth and throat. If uneontrolled, this progresses to a neerotizing stomatitis and pharyngitis with high fever, prostration and finally death from septicemia.

Treatment is therefore directed toward combating infection with suitable antibiotics. With cessation of the guilty drug, and if the infection can be controlled, the white count returns to normal in several days. Because of the acuteness of the onset, periodic blood counts are of dubious value in anticipating granulocytopenic drug reactions.

The drugs which induce granulocytopenia include:

Most frequently seen	*Others*
Aminopyrine	Sulphonamides
Hydantoins	Chloromycetin
Phenylbutazone	Streptomycin
Thiouracils	Antihistaminics
	Salicylates
	Arsenicals
	Gold salts
	Procaine amide
	Chlorpromazine

Aminopyrine is of historical interest since it was the first drug definitely proved to be responsible for a granulocytopenic reaction. It has long since fallen into disrepute for this reason. *Phenylbutazone* is in fairly common use today despite the fact that it is far more dangerous than aminopyrine. It is also versatile in that it can produce thrombocytopenia and aplastic anemia as well as granulocytopenia. The *hydantoins* also produce several types of blood dyscrasia. Granulocytopenia is most commonly due to Tridione. The danger of granulocytopenia following *thiouracil* in antithyroid therapy has been decreased but not eliminated with the use of propylthiouracil in its stead. *Chlorpromazine* is of current interest since it has been in use only a short while and reports of agranulocytosis following its use are now appearing in the literature.

B. THROMBOCYTOPENIC PURPURA

The second of the hematologic reactions is thrombocytopenic purpura. Clinically it is similar to thrombocytopenic purpura from other causes—there are hemorrhages into the skin and mucous membranes, increased bleeding time, normal clotting time, etc. In some cases marked thrombocytopenia may exist without hemorrhages. In thrombocytopenic drug reactions, the bone marrow shows decreased numbers of megakaryocytes and no platelets. The peripheral blood is normal except for complete or almost complete absence of platelets.

The mechanism of production of this reaction has been convincingly shown to be of the allergic type. Ackroyd's studies of Sedormid sensitivity have suggested that the drug acts as a haptene and combines with platelets to form a complete antigen. In vitro studies have demonstrated lysis of platelets in the presence of the drug, by serum from a sensitized individual, and consumption of complement in the process.

This reaction may come on at any time during treatment with a sensitizing drug, but usually follows prolonged use. The onset is acute and follows shortly after the last dose. In most cases recovery takes place soon after cessation of the drug. Fatalities, when they occur, are usually due to cerebral hemorrhage.

Aside from stopping the drug, treatment consists in transfusion of fresh whole blood using non-wettable equipment. The amount depends on the severity of the hemorrhage. Cortisone and ACTH have also been used and may be helpful in reducing capillary permeability. In the rare case which becomes chronic, splenectomy may be tried.

The drugs that induce thrombocytopenic purpura include:

Most frequently seen	*Others*
Sedormid	Penicillin
Quinidine	Sulphonamides
Arsenicals	Gold salts
Phenylbutazone	Quinine
	Thiouracils
	Hydantoins
	Procaine
	Estrogens

Sedormid was the first to be incriminated as producing this type of reaction and its use has since declined. *Phenylbutazone* is more often reported as producing agranulocytosis than thrombocytopenic purpura; however a series collected in 1953 suggests that the reverse may be true. Of 1526 cases treated with the drug there were eleven cases of granulocytopenia and thirty-four of thrombocytopenic purpura. *Quinidine* is perhaps the commonest cause of drug-induced thrombocytopenia today. Its mechanism has been extensively studied by Dameshek and others and shown to be identical with Sedormid.

C. HEMOLYTIC ANEMIA

Hemolytic anemia is the least frequently encountered of the hematologic drug reactions. It is usually of the acute type, and severe. Little is known of the mechanism involved, but it is believed to be of the antigen-antibody type.

This reaction is most frequently caused by the *sulphonamide* group of drugs. Reactions following *Mesantoin* and *PAS* have also been reported, and it was noted that one case following Mesantoin demonstrated a positive direct Coombs test.

D. APLASTIC ANEMIA

Aplastic anemia is the most severe of the drug-induced blood dyscrasias. Unlike the previously discussed reactions which selectively involve one of the blood elements only, in aplastic anemia there is an effect on all elements. The reaction is primarily in the bone marrow, producing hypoplasia or complete aplasia, and as a result peripheral pancytopenia. The manifestations are therefore those of anemia plus those due to granulocyte and platelet deficiency. These latter manifestations, that is, infection and hemorrhage, are responsible for most of the deaths in aplastic anemia. The depression of the various blood elements may be of different degree with one or more of the syndromes predominating.

Drug-induced aplastic anemia occurs most frequently in patients on prolonged or intermittent treatment with sensitizing drugs. Its onset is often acute and the depression of granulocytes and platelets may precede the development of anemia. Unlike granulocytopenic and thrombocytopenic drug reactions, aplastic anemia does not tend to recover spontaneously after cessation of the drug, but is often progressive and irreversible despite treatment.

The treatment, aside from removal of the offending drug, is aimed at tiding the patient over until his bone marrow regenerates. Transfusion of fresh whole blood is the best measure in this regard and may have to be repeated over weeks or months in slowly recovering cases. Antibiotics are given to prevent infection in this vulnerable state. Stimulation of the bone marrow with cortisone and cobalt has been used with good results by some people.

The drugs that induce aplastic anemia include:

Most frequently seen	*Others*
Chloromycetin	Arsenicals
Hydantoins	Gold salts
Quinacrine	Mercurials
	Streptomycin
	Sulphonamides
	Apresoline
	PAS

The *hydantoins* have already been mentioned as a cause of granulocytopenia. Most of the cases of aplastic anemia have followed the use of Tridione. *Chloromycetin* is of interest because of its fairly recent identification as a potentially dangerous drug. When first introduced, it was lauded as having no untoward reactions. However, within a few years reports began to appear of blood dyscrasias (chiefly aplastic anemia) following its use, and a survey in the

United States in 1953 unearthed quite a few such reactions. The feeling at present is that these reactions are rare, relative to the wide use of the drug, and that it is not as dangerous to use as was thought at that time. Its hazards, however, are significant enough to warrant limiting its use to those situations where it is specifically indicated.

II. Serum Sickness Pattern

The serum sickness pattern is one of the commonest of the drug reactions. The complete syndrome consists of fever, urticaria, arthralgia and lymphadenopathy. However all these do not always appear and in fact fever, or urticaria, or both together are often the only manifestations seen. The mechanism of production is almost certainly allergic, and in true serum disease, antibodies (precipitins) are demonstrable in the blood. The relationship of these antibodies to the production of symptoms is however not known.

The onset of symptoms is commonly between the seventh to tenth day of treatment. When previous sensitization or cross-sensitization has occurred the onset may be immediate. The duration and severity of the symptoms depends largely on the dose of drug given. They may fade in a few hours or last for weeks. (This persistent reaction is commonest following penicillin.)

Treatment in most cases is unnecessary, other than stopping the drug. If the symptoms are severe or persisting, cortisone or compound F is usually curative.

Prevention of reactions of this type in patients who give a history of hypersensitivity may be attempted in several ways:

1. use another drug. This is the surest and safest way.
2. desensitize the patient, beginning with small doses,
3. give an antihistaminic along with the drug. Some report good results,
4. go ahead and give the drug, and treat the reaction as outlined if and when it appears.

The drugs that induce the serum sickness pattern include:

Most frequently seen	*Others*
Serums and vaccines	Arsenicals
Penicillin	Mercurials
Sulphonamides	Barbiturates
Streptomycin	Salicylates
Thiouracils	Phenylbutazone
	Apresoline
	Digitalis
	Quinidine
	Hydantoins
	Iodides

Apart from the *serums,* which are believed to produce symptoms in all people if the dose is large enough, *penicillin* is responsible for the greatest number of reactions of this type. Of the different types of penicillin available, oral penicillin is the least sensitizing and the long-acting injectible types the most sensitizing. The most frequent manifestation of the serum sickness pattern following *sulphonamides* or *streptomycin* is fever alone. This possibility should always be kept in mind when treating patients with these drugs where infection with fever is already present.

III. Anaphylactic Shock

The syndrome of anaphylactic shock is the most alarming and dangerous of all the drug reactions. It is not identical with, but resembles in many respects the anaphylactic shock produced in experimental animals by sensitization with foreign protein. The mechanism in human subjects is thought also to be allergic in nature. Histamine is believed to play some part in this reaction, but its role is still not completely understood.

Two clinical pictures are sometimes differentiated. Both begin within ten

minutes of giving the causative drug. The first begins with prodromal symptoms of headache, flushing of the face and a feeling of apprehension. Over the next ten to twenty minutes there may be increasing dyspnea, marked fall in blood pressure and finally coma and death. The second has a very acute onset, with immediate collapse, a precipitous fall in blood pressure, shallow respiration, and may rapidly end in convulsions and death.

Treatment of anaphylactic shock must be immediate if it is to be of any value. An attack may be aborted by the subcutaneous administration of adrenaline and by the application of a tourniquet proximal to the site of injection of the guilty drug (if this is possible). When shock is severe, intravenous adrenaline should be given, and if this fails intra cardiac administration is indicated.

In patients who give a history of this type of reaction, the sensitizing drug should not be given. However, if its administration is imperative, the precautionary measures mentioned in connection with serum sickness may be tried. Also, the administration of adrenaline with the drug may avert a reaction.

The drugs that induce anaphylactic shock include:

Most frequently seen	*Others*
Penicillin	Thiamine
Serums and vaccines	Salicylates
Pollen and dust extracts	Tetraethylammonium
Organ extracts	Amigen
Mercurials	Aureomycin
Iodides (especially contrast media)	Streptomycin
Local anesthetics	Sulphonamides
	Cortisone
	Procaine amide

Penicillin is probably the single most frequent cause of shock, although compared with the vast amount used, the relative incidence of this reaction is very small. It is estimated that betwen one and two hundred shock reactions occur annually in the United States following penicillin administration, and that about 30% of these are fatal. Of the foreign *serums,* tetanus antitoxin is the most frequent cause of shock. This speaks strongly for the use of tetanus toxoid whenever possible in its place, a practice which unfortunately has not yet become universal. *Organ extracts* which have produced shock include liver extract and various pituitary extracts. Fortunately, insulin rarely if ever produces anaphylaxis. *Desensitization* procedures in the treatment of various allergic conditions, using extracts of bacteria, dusts or pollens, have caused a significant number of deaths from shock.

IV. Collagen Disorders

Syndromes resembling two of the collagen diseases have occasionally been reported following treatment with certain drugs. A hypersensitivity arteritis resembling polyarteritis nodosa has occurred, and more recently a syndrome resembling disseminated lupus erythematosus has been noted.

A. hypersensitivity arteritis

Zeek, in 1948, produced two pathologically distinct types of arteritis in rats by different methods and later correlated these two entities with two clinically and pathologically distinct types of polyarteritis observed in humans, true polyarteritis nodosa on the one hand, and hypersensitivity arteritis on the other. They may be distinguished according to the accompanying table.

This full blown picture of hypersensitivity arteritis is not seen as frequently as is a necrotizing arteritis which is often found in patients dying of other types of drug reaction, particularly serum sickness. The mechanism of production of this reaction is not known.

	Polyarteritis Nodosa	Hypersensitivity Arteritis
Clinically:		
Course	long (years)	short (months or weeks)
Symptoms	Many systems, G-I, hypertension, peripheral neuritis	Fever, skin eruptions, nephritis, myocarditis
Drug history	unusual	usual
Pathologically:		
Age of lesions	various stages	all at same age
Location on vessel	chiefly at bifurcations	anywhere
Lung or spleen involvement	rarely	frequently
Vein involvement	rarely	frequently

The drugs that may produce a hypersensitivity arteritis include sulphonamides, penicillin, thiouracils, hydantoins, serums, mercurials and iodides. With cessation of the causative drug, the disease occasionally abates, but more often progresses to a fatal termination. ACTH and cortisone have been used with some success and are the best treatment available.

B. Disseminated Lupus Erythematosus

A disease resembling disseminated lupus has been recently reported in a few patients taking *Apresoline*. They had typical skin eruptions, polyserositis, fever, albuminuria and positive L.E. test. A similar reaction following *cortisone* therapy has also been noted. Whether or not these cases are identical with true lupus is not known. There is a suggestion that true lupus erythematosus may arise as a manifestation of some other sensitivity, but little is known about this.

V. Hepatitis

Drug reactions involving the liver are uncommon, and when they do occur it is often difficult to be sure whether they are hypersensitivity reactions or toxic effects of the drug used. The clinical and laboratory picture may be either that of a true hepatitis or of obstructive jaundice. This latter form is being recognized with some frequency following *chlorpromazine* administration. It is believed to be due to some unknown hypersensitivity mechanism causing stasis and coagulation of bile in the bilary tree, and results in obstructive jaundice. This reaction is usually transient and subsides within three or four weeks of stopping the drug. Other drugs which have produced jaundice are gold salts, arsenicals, hydantoins, thiouracils.

VI. Neuritis

Nervous system reactions are rare. The commonest are Landry's type of

paralysis, peripheral neuritis and transverse myelitis. There are usually skin manifestations of hypersensitivity as well. These lesions usually recover completely if treated with ACTH or cortisone. Drugs which cause neuritis include serums and vaccines, penicillin, chloromycetin and sulphonamides.

VII. Asthma

An asthmatic state induced by drugs is rare, but has been reported in individuals such as pharmacists who are repeatedly exposed to drugs in powder form which may be inhaled. More commonly, individuals who already have atopic asthma due to other allergens may become sensitized to certain drugs as well, and react to them with typical asthmatic attacks. The treatment is the same as that for any asthmatic attack. There are many drugs which may produce this reaction, the commonest being pollen extracts, serums and vaccines, and salicylates.

Conclusion

Although these reactions occur relatively infrequently, they nevertheless present a significant danger. It is therefore important for anyone using sensitizing drugs to be aware of their hazards and to utilize precautions wherever possible.

By far the most important consideration in the administration of any one of these drugs is whether its use is really justified in a particular circumstance. In pursuing any course of treatment, one must weigh the probable benefit to the patient gained by the treatment against the possible bad effects which may appear. It is the physician's duty to select not only the most potent drug to do the job at hand, but also to try to select the one which will do the least harm. In the case of life-threatening diseases, the former consideration becomes much more important and often allows no alternatives; however, in selecting drugs for use in minor illnesses, or in providing symptomatic relief only, it becomes more difficult to justify the use of potentially dangerous drugs.

Acknowledgment

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The Use of Radioactive Iodine in the Diagnosis and Treatment of Hyperthyroidism: Ten Years' Experience: E. M. Chapman and F. Maloof, Medicine, 34: 261, 1955.

In this excellent 53-page summary of the results of ten years' use of therapeutic radioactive iodine, the authors give a brief historical review of hyperthyroid therapy, discuss the metabolic pathways of iodine and thyroid hormone in the body, and then turn to the different indices of thyroid function. These latter vary in hyperthyroidism as follows: (*a*) the 48-hour uptake and retention of I^{131} by the thyroid is markedly increased, from the normal 20–55% to 80–90% in many cases; (*b*) the serum protein-bound iodine (PBI) exhibits a distinct increase above the normal 3.5–8.0 micrograms percent; (*c*) the basal metabolic rate (BMR) may be elevated as much as 100%; (*d*) the serum cholesterol shows a less consistent drop below the normal level of 100–250 mgm. percent; and (*e*) a number of lesser functions also vary from normal, including the serum and urinary creatine levels, the serum magnesium level, and the body calcium metabolism.

The possible undesirable effects of this radioactive therapy includes radiation sickness, and myxoedema due to over-destruction of thyroid tissue. There is no conclusive evidence of a carcinogenic effect of this treatment.

With I^{131} administration, a single dose of 160 microcuries per gram of estimated thyroid weight is the average amount required. This isotope is now preferred to the earlier I^{130} used. Patients given radioactive iodine were over 40 years of age, except in certain younger inoperable cases of goitre. Clinical responses to I^{131}, the effects of anti-thyroid drugs and iodides, the recurrences of hyperthyroidism, and other related points are also discussed.

In the use of radioactive materials, proper precautions must be taken amongst all associated personnel to avoid overexposure, which may have three biologic effects: a genetic effect, a carcinogenic effect, and a shortening of the life span.

In conclusion, it is decided that a definite correlation exists between radioactive iodine therapy and changes in the various indices of thyroid function, the indices returning to normal by two months after adequate treatment.

D. C. Price

An Effective Oral Antidiabetic Drug: F. Bertram, E. Bendfeldt, and H. Otto, Deutsche Medizinische Wochenschrift, 80: 1455, 1955.

The authors outline a series in which sulfanilyl-n-butyl-urea (BZ55), a drug of the sulphonamide group which has been discovered to have hypoglycemic effects, was used in 82 patients with diabetes mellitus. All of these patients were carefully studied by frequent blood sugar determinations, glucose tolerance tests and urine examinations before and during the trial period. BZ55 was administered in 0.5 Gm. tablets; five were given on the first day of treatment, three the second and two daily thereafter.

The results were as follows:

1. Young diabetics showed practically no response to these and higher doses.

2. Older patients who had been inadequately treated, or not treated at all (28 such patients, ages 49 to 77), showed the best response. All but three had rapid

decrease in blood sugar levels to below 150 mg.%, and in some of these the drug could be discontinued and control maintained by diet alone.

3. Three patients with mild acidosis showed poor response despite high doses.

4. Of 38 patients between the ages of 41 and 77, who had previously been on insulin, complete replacement of the insulin by BZ55 was achieved in 28.

No harmful or unpleasant side-effects were observed in any of the patients. The mode of action of BZ55 is thought to be via interference with glucagon production by the alpha-cells of the pancreas. The authors stress that further study is needed before the use of this drug can be routinely recommended in the elderly diabetic.

B. LANGER

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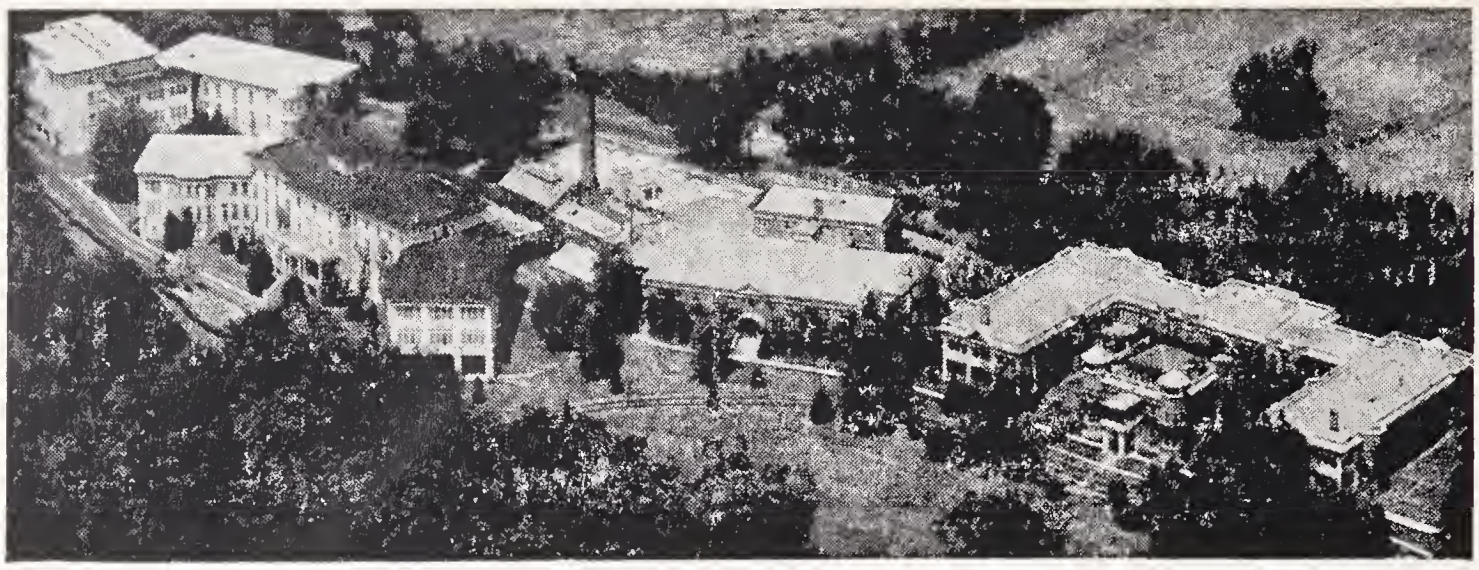

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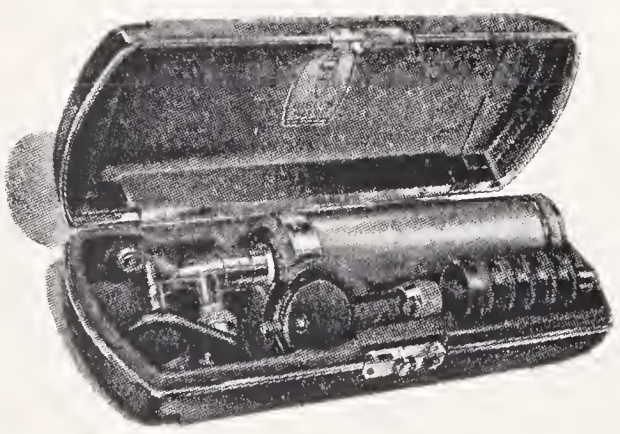

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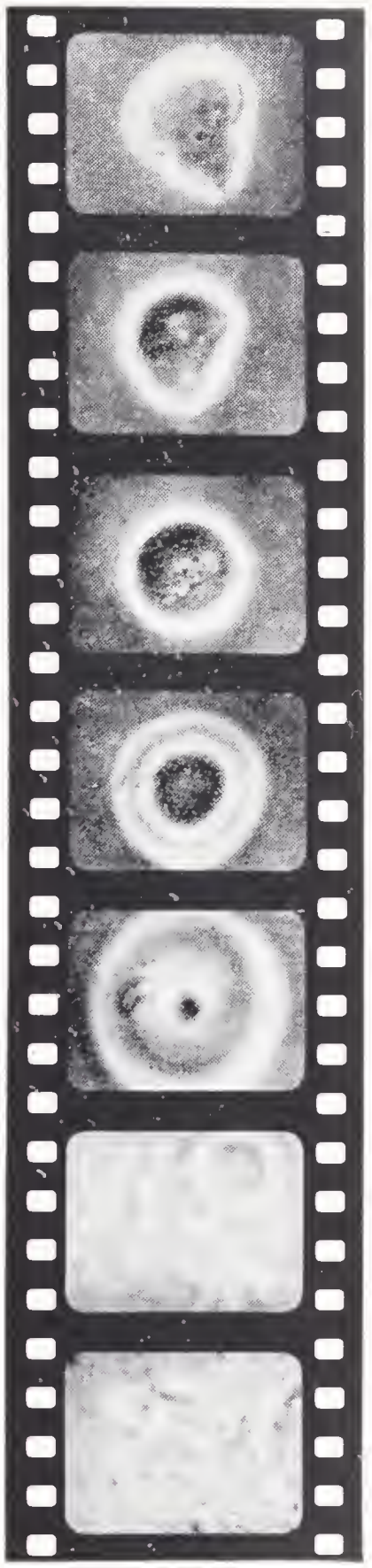
No trichomonad escapes — The fast triple action of VAGISEC liquid dooms the trichomonad. Three surface-acting agents combine in synergistic attack,[1] to weaken the cell membrane, to remove waxes and lipid materials from the membrane surface, and to denature the protein. With its cell wall destroyed, the parasite imbibes water, swells and explodes. All this occurs within 15 seconds. Only scattered fragments remain.

No other agent or combination of agents kills the trichomonad in this specific fashion or with the *speed* of VAGISEC liquid.[3] When the patient uses VAGISEC jelly as well — the recommended routine — these good effects continue indefinitely.[4]

The Davis technique — Office therapy with VAGISEC liquid is combined with home treatment. Both liquid and jelly are prescribed.

> OFFICE TREATMENT — *Wipe vaginal walls dry with cotton balls, then wash thoroughly for about three minutes with a 1:250 dilution of* VAGISEC *liquid. Remove excess fluid with cotton balls. Dr. Davis recommends three treatments the first week, two the second and one the third.*
>
> HOME TREATMENT — *Patient douches with* VAGISEC *liquid at night and inserts* VAGISEC *jelly every morning except on office treatment days, through two menstrual periods. Douching is contraindicated for pregnant women.*

Husband re-infects wife — Since "trichomonads may be passed from the infected male to the uninfected partner during coitus,"[5] prevent re-infection by recommending the use of condoms. Specify RAMSES,* the finest possible rubber prophylactic, transparent, very thin yet strong; or XXXX (FOUREX)* skins, of natural animal membrane — pre-moistened. Your prescription of one of these brands insures the protection afforded by Schmid quality condoms and assures full acceptance of your regimen. At all pharmacies.



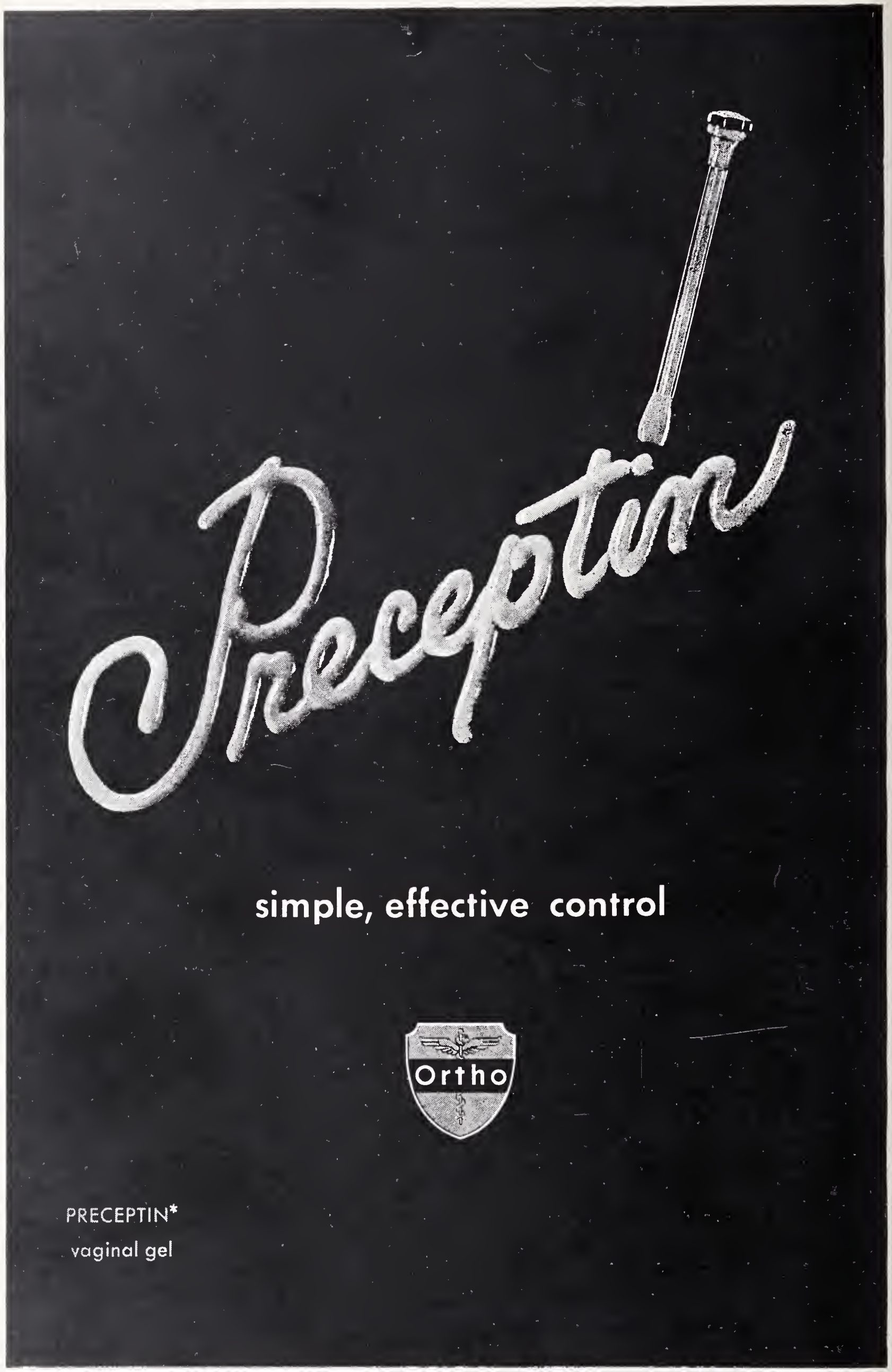
Top to bottom:
2 sec. CONTACTS
4 sec. COMPLEXES
6 sec. DISSOLVES
8 sec. DENATURES
10 sec. SWELLS
15 sec. EXPLODES
16 sec. SCATTERS

Active ingredients in VAGISEC liquid: Polyoxyethylene nonyl phenol, Sodium ethylene diamine tetra-acetate, Sodium dioctyl sulfosuccinate. In addition, VAGISEC jelly contains Boric acid, Alcohol 5% by weight.

JULIUS SCHMID (Canada) Ltd.
32 Bermondsey Road, Toronto 16, Canada

†Pat. App. for *Trade-marks

1. Davis, C. H.: J.A.M.A. *157*:126 (Jan. 8) 1955. 2. Davis, C. H.: West. J. Surg. *63*:53 (Feb.) 1955. 3. Davis, C. H., and Grand, C. G.: Am. Jour. Obst. & Gynec. *68*:559 (Aug.) 1954. 4. Davis, C. H. (Ed.): Gynecology and Obstetrics (revision), Hagerstown, Md., W. F. Prior, 1955, vol. 3, chap. 7, pp. 23-33. 5. Draper, J. W.: Internat. Rec. Med. *168*:563 (Sep.) 1955.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